MOTOROLA

SPECTRA Desktop Station
for use in SMARTNET Trunked

SPECTRA Desktop Station

Performance Specifications
General

	Model Number	Factory ID	Channel Capacity
VHF:	Conventional L99ZX/336L	L53KXM	
	Trunked L99ZX/335L	L53ZXM	128 conventional modes
UHF:	Conventional L99ZX/346L	L44KXM	8 trunked systems; 16 talkgroups; 32 conventional modes
	Trunked L99ZX/345L	L44ZXM	
800 MHz:	Conventional L99ZX/256L	L35KXM	
	Trunked L99ZX/255L	L35ZXM	
900 MHz:	Conventional 4 W	L27KMM	
	Trunked 4 W	L27KGM	128 conventional modes
	Conventional 12-6 W	L37KMM	15 trunked systems; 16 talkgroups; 10 conventional modes
	Trunked 12-6 W	L37KGM	

Squelch Capability:	Private-Line, Digital Private-Line coded squelch and/or Carrier Squelch
Temperature Range:	$-30°$ to $+60°$ C
Humidity:	90-95% relative humidity @ 50° C
Dimensions:	4.25" H × 15.75" W × 17" L (107.95 mm × 400.05 mm × 431.8 mm)
Weight:	20 lbs. (9.1 kg.)
AC Requirements:	105-132, 187-265 VAC. 47-63 Hz
Battery Revert/Trickle Charger Charging Current: (option)	100 mA

	VHF	UHF	800 MHz	900 MHz*
Frequency Range:	Range 1: 136-162 MHz Range 2: 146-174 MHz	Range 1: 403-433 MHz Range 3: 450-482 MHz Range 4: 482-512 MHz	Rx: 851-869 MHz Tx: 806-824 MHz & 851-869 MHz (talkaround)	Rx: 935-941 MHz Tx: 896-902 MHz 935-941 MHz
FCC Designation:	ABZ89FT3732	ABZ89FT4736	ABZ89FT5712	ABZ89FT5703 (4 W) ABZ89FT5666 (12 W)
Channel Spacing:	25, 30 kHz	25 kHz	25 kHz, 12.5 kHz from 866-869 MHz	12.5 kHz
RF Power Output:	25-50 W	20-40 W	8-15 W	4 W, 6-12 W

Power Supply

AC CURRENT DRAIN (TYPICAL) (110 VAC/220 VAC)

VHF				UHF				800 MHz				900 MHz			
RF Output	Duty Cycle	Receive	Transmit	RF Output	Duty Cycle	Receive	Transmit	RF Output	Duty Cycle	Receive	Transmit	RF Output	Duty Cycle	Receive	Transmit
25 W	100%	0.7A/0.4A	1.42A/0.72A	20 W	100%	0.7A/0.4A	1.33A/0.67A	15 W	100%	0.7A/0.4A	1.15A/0.58A	4 W	100%	0.7A/0.4A	0.8A/0.4A
50 W	50%	0.7A/0.4A	2.30A/1.16A	40 W	50%	0.7A/0.4A	2.30A/1.16A					12 W	100%	0.7A/0.4A	1.33A/0.67A

DC CURRENT DRAIN (TYPICAL) @ 13.8 VDC

RF Output	Standby	Receive	Transmit	RF Output	Standby	Receive	Transmit	RF Output	Standby	Receive	Transmit	RF Output	Standby	Receive	Transmit
25 W	1A	3A	8A	20 W	1A	3A	7.5A	15 W	1A	3A	6.5A	4 W	1A	3A	4.5A
50 W	1A	3A	13.5A	40 W	1A	3A	13A					12 W	1A	3A	7.5A

Transmitter

	VHF	UHF	800 MHz	900 MHz
Spurious & Harmonic Emissions:		-70 dBc		
Frequency Stability:	0.00025% of assigned center frequency from $-30°$ C to $+60°$ C ambient ($+25°$ C reference)		± 0.00015% of assigned center frequency from $-30°$ C to $+60°$ C ambient ($+25°$ C reference)	
Modulation:	20K0F1E, 16K0F3E, 16K0F1D, 15K0F2D			11K0F3E, 11K0F2D, 10K0F1D
Maximum Frequency Separation:	26 MHz for Range 1 28 MHz for Range 2	30 MHz for Range 1 and Range 4 32 MHz for Range 3	18 MHz within each of two groups: 806-824 & 851-869 MHz	6 MHz within each of two groups: 896-902 and 935-941 MHz
FM Hum and Noise: EIA Method	-45 dB	-40 dB	-35 dB	
Audio Response:	+1, -3 dB from 6 dB/octave pre-emphasis (300 to 3000 Hz)			
Audio Distortion:	less than 5% measured per EIA			
Output Impedance:	50 ohms			
Audio Sensitivity:	80 mV ± 3 dB for 60% max. deviation @ 1000 Hz			

Receiver

	VHF	UHF	800 MHz	900 MHz
Sensitivity: 20 dB Quieting EIA SINAD		(Per EIA spec. RS204C) 0.50 μV 0.35 μV		(Per EIA spec. RS204C) 0.40 μV 0.30 μV
Selectivity: EIA SINAD	-85 dB @ ± 25 kHz -90 dB @ ± 30 kHz	-85 dB @ ± 25 kHz	-80 dB @ ± 25 kHz	-70 dB @ ± 12.5 kHz -80 dB @ ± 25 kHz
Spurious & Image Rejection:		90 dB		
Intermodulation: EIA SINAD	-85 dB @ ± 25 kHz		-80 dB @ ± 25 kHz	-70 dB @ ± 12.5 kHz -80 dB @ ± 25 kHz
Maximum Frequency Separation:	26 MHz for Range 1 28 MHz for Range 2	30 MHz for Range 1 and Range 4 32 MHz for Range 3	18 MHz	6 MHz
Frequency Stability:	0.00025% of assigned center frequency from $-30°$ C to $+60°$ C ambient ($+25°$ C reference)		± 0.00015% of assigned center frequency from $-30°$ C to $+60°$ C ambient ($+25°$ C reference)	
Audio Response:	+1, -3 dB from 6 dB/octave de-emphasis (300 to 3000 Hz)			
Audio Output at External Speaker: (local control only)	5 W @ less than 5% distortion			
Input Impedance:	50 ohms			

* Securenet is not available at 900 MHz.

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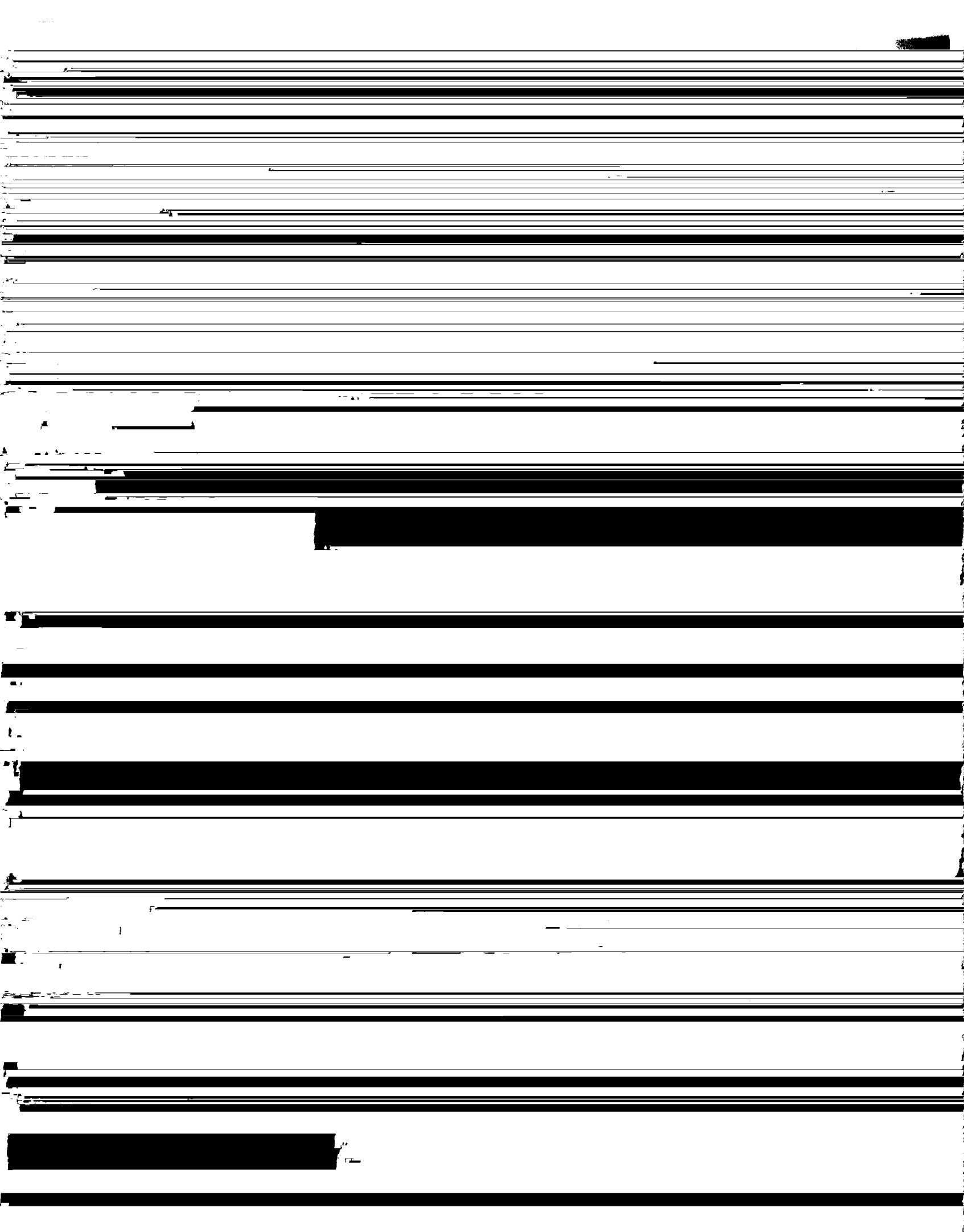
INTRAC 2000 System Modular Remote Terminal Unit Plus

STANDARD
Feature/Advantage

High Reliability/Maximum Features/Compact Design—The MRTU PLUS is a fourth generation remote terminal unit that uses today's microprocessor and EEPROM technologies to reduce an INTRAC 2000 MRTU PLUS into a single, compact module that performs all of the encoder/decoder functions and more.

The MRTU PLUS offers a new standard in RTU design that is second to none; combining high reliability, maximum standard features and compact design.

Trunked and 928 MHz System Availability—Along with the models for VHF, UHF and 600 ohm wireline operation, the MRTU PLUS offers models for operation on Motorola Privacy Plus or Smartnet trunked and Darcom 9000 Point-To-Multipoint radio systems.

The MRTU PLUS offers the widest range of radio-based RTUs available in the industry.

Fully Modular and Expandable—The MRTU PLUS combines modular "building block" construction with an "onboard" field re-configurable data base, allowing the unit's capabilities to be easily expanded using a wide variety of input and output modules.

Allows the initial units to meet current needs while allowing easy field reconfiguration to your future needs. Spare modules can be stocked for expansion or "instant repair."

Digital and Analog Inputs—The MRTU PLUS can monitor and report the status of normally open (NO) or normally closed (NC) dry contacts and, optionally, the values of current or voltage analog inputs.

Digital inputs provide for reporting of alarms or status changes, such as intrusion or fire alarms and door open or closed. Analog inputs provide reporting of measured values, such as motor speed, fluid levels and fluid flow.

Digital or Analog Control Outputs—The MRTU PLUS can generate momentary or latched relay contact outputs and, optionally, proportional current or voltage analog outputs.

Digital controls provide for relay control of electrical equipment, such as switching motors and heating or cooling devices on and off. Analog controls provide for the adjustment of operating conditions such as proportionally opening

Heavy Duty Housings—The MRTU PLUS is supplied in a NEMA-4 rated, metal housing suitable for wall or pole mounting. A removable bottom plate allows easy machining when special holes are required.

The NEMA-4 metal housing offers rugged construction and environmental durability.

Local Display—The basic MRTU PLUS and each status expansion module includes a built-in LED local status display.

Offers an "on site" display of status inputs to aid the technician in correction of reported problems.

Self-Diagnostic Capability—Each MRTU PLUS is equipped with a pushbutton activated self-test program that signals the condition of the unit on the LED local display.

Reduces equipment downtime and service costs by identifying the module or cable that needs repair or replacement.

Easy Installation and Service—Each MRTU PLUS module can be easily removed via two screws and two "quick-disconnect terminal" plugs.

Allows easy addition or replacement of input or output modules reducing equipment downtime and service costs.

Channel Monitoring—The MRTU PLUS monitors the radio channel before transmitting.

Reduces the possibility of missed alarms due to units "talking over" each other on the radio channel.

Secure Signalling—INTRAC 2000 messages are transmitted using a signalling format specifically designed for radio operation. Each status or control message contains a high level of error checking and information redundancy.

Ensures accurate and reliable operation with no false alarms or erroneous controls even during noise conditions.

Contention or Polling—Status input and analog value changes are transmitted "as soon as they happen" at the MRTU PLUS (Contention) and/or in response to interrogation from the central unit (Polling).

Multiple Addressing—An MRTU PLUS can be optionally assigned up to 4 individual INTRAC 2000 RTU addresses from the system pool of 512 addresses.

Allows an Individual MRTU PLUS to support a large number of digital and analog inputs in a very cost effective manner.

Expanded Input/Output Capability—The MRTU PLUS's input/output capability can be optionally expanded using a second outdoor housing with interface modules and cabling to hold additional I/O modules.

Used with the multiple addressing option, allows an individual MRTU PLUS to support up to a total of 16 input/output modules.

Counter Input Capability—The MRTU PLUS can optionally monitor and report counter (totalizer), pulse duration, pulse rate inputs or equipment runtimes in place of the basic digital inputs.

Provides additional inputs for the measurement and reporting of counted occurrences, water flows, power consumption, power demand and equipment runtimes.

Interpose Relay Outputs—The MRTU PLUS can optionally use its digital control relays to control, on a one-at-a-time basis, high current relays.

Provides the ability to switch high current circuits in and out without using external high current relays.

High Level Input Protection—An MRTU PLUS can be optionally equipped to optically isolate its digital inputs to meet both IEEE 472 and IEEE 587 surge protection standards.

Reduces dependence on external protective devices and allows installation of units in harsh electrical environments.

Voice Capability—Radio-based MRTU PLUS's can be optionally equipped to be selectively called by an INTRAC 2000 central unit and then to provide voice communication between itself and the central unit.

Allows maintenance personnel working at remote MRTU PLUS equipped sites to be contacted by and to communicate with the central location.

The MRTU PLUS is a high quality remote terminal unit capable of handling many alarm and control requirements. Simply consult the chart below to find your application and the associated sensor types.

Fresh Water Supply

Well/Tank Level	High/Low float contacts or transducer
Reservoir Level	High/Low float contacts or transducer
Water Flow	Transducer
Water Presssure	High/Low contacts or transducer
Pump Control	Relay contact
Pump Status	On/Off contact
Pump Run Time	On/Off contact

Sewage Treatment

Wet Well Level	High/Low float contacts or transducer
Dry Well Level	High/Low float switch
Sewage Flow	Transducer
Pump Control	Relay contact
Pump Status	On/Off contact
Pump Run Time	On/Off contact

Property Protection

Door/Window Alarm	Magnetic switch or tape
Motion Detector	Infrared or microwave sensor contact
Sound Detector	Sensor contact
Fire Alarm Pull	Switch contact
Smoke Detector	Sensor contact
Lighting Control	Relay contact
Zone Arm/Disarm	Relay contact
Zone "Trouble"	Relay contact
Temperature	High/Low contacts or thermostat
Humidity	High/Low contacts or transducer
AC Power Loss	Relay contact

Electrical Distribution

Breaker Control	Relay contact
Breaker Status	Open/Close contact
Reclosure Control	Relay contact
Reclosure Status	Open/Close contact
Capacitor Switching	Relay contact
Voltage	Transducer
Current	Transducer

Petroleum/Chemical

Well/Tank Level	High/Low float contacts or transducer
Pump Control	Relay contact
Pump Status	On/Off contact
Pump Run Time	On/Off contact
Pressure	High/Low contacts or transducer
Leakage	Sensor contact or transducer

Fire Station Dispatch

Alert Horn Control	Relay contact
PA Control	Relay contact
Lighting Control	Relay contact
Door Control	Relay contact
Smoke Detector	Sensor contact
Door/Window Alarm	Magnetic switch or tape

Agriculture

Vineyard Frost Warning	Low temperature transducer or contact
Orchard Frost Warning	Low Temperature transducer or contact
Confinement Bldg. Temp.	High/Low temperature contacts or transducer
Freezer Temperature	High/Low temperature contact or transducer

INTRAC 2000 System Modular Remote Terminal Unit Plus

Performance Specifications

Frequency (MHz)	Model	Typical Power Output	Transmitter RF Spurious Emissions (Below Carrier)	Receiver Sensitivity (20 dBQ)	Receiver Selectivity @ 25 kHz	Receiver Spurious & Image	Frequency Stability −30°+60°C (+25°C Ref.)	Primary Power	Operating Temperature
136-174	F6523 F6723	2 W	50 dB	1.0 μV	80 dB	70 dB	T = 0.0005% R = 0.001%	115/230 VAC (+10%, −15%) 50/60 Hz	−30°C to +60°C Up to 90% relative humidity non-condensing
	F6553 F6753	5 W	50 dB	1.0 μV	80 dB	70 dB	T = 0.0005% R = 0.001%		
	F6573 F6773	20W	57 dB	1.0 μV	75 dB	75 dB	T = 0.0005% R = 0.0005%		
403-430 440-470	F6514 F6714	2 W	50 dB	1.0 μV	70 dB	70 dB	T = 0.0005% R = 0.0007%		
	F6544 F6744	4 W	50 dB	1.0 μV	70 dB	65 dB	T = 0.0005% R = 0.0005%		
	F6574 F6774	20 W	70 dB	1.0 μV	85 dB	95 dB	T = 0.0005% R = 0.0005%		
800 MHz Trunked	F6585 F6785	15 W	56 dB	1.0 μV	75 dB	75 dB	T = 0.00025% R = 0.00025%		
928-960 (Darcom)	F6556 F6756	5 W	55 dB	0.5 μV	60 dB	60 dB	T = 0.00015% R = 0.0003%		

Battery Backup:	Avg. 20 hrs (5 AH)/30 hrs (10 AH) @ +25°C, one 2-second transmission per hr
Address Capacity:	Up to 512 per system selected from 2048 available INTRAC addresses
Data Rate:	600 Baud using FSK tones of 900/1500 Hz
Word Length:	Approximately 80 milliseconds
Transmit Airtime:	Typically 0.5 seconds (2.0 seconds maximum per remote)
Code Security:	Concatenated code including Bose Chaudhuri, parity, bit count and sync check
Digital Inputs:	Basic: 8 or 6. Expanded: up to 128 max. (dry contact, < 3Kohm = closed, > 40Kohm = open)
Counter Inputs	Optional: up to 8 max. of 4 types: Counter: divide by 1 or 50000, Pulse duration: 1s/3s/5s, 3s/9s/15s or 0s/13.5/15s Pulse rate: Up to 100 Hz max. or Runtime: Up to 999 sec/min/hour max.
Analog Inputs:	Basic: 0 or 1 (4-20ma). Expanded: Up to 24 max. (two ranges: ±1V, 4-20 ma)
Digital Outputs:	Basic: 1 or 2 (momentary). Expanded: Up to 34 max. (momentary or latching, rating .6A @ 125 Vac)
Analog Outputs:	Expanded: Up to 8 max. (five ranges: 0-1V, ±1V, 0-5V, ±5V, 4-20 ma)
Analog Resolution:	Basic: 8 bit. Expanded: 10 bit, 2's complement, accuracy ±0.1% FS, 50 ppm/°C
Transient Protect:	Standard: 2.5 kV per ANSI C37.90-1978 standard, non-destructive Expanded: 3.0 kV IEEE 472 and 6 kV, 3 kA IEEE 587 standards, non-destructive
Transmit Repeats:	Up to 16 with a variable 10-80 seconds repeat interval
Acknowledge Mode:	Stops transmission repeats after acknowledgement from Central
Periodic Tx Timer:	Capable of initiating a transmission at rates from 5 minutes to 48 hours
Housing Type and Size:	F65-Series: NEMA-4 metal: 14.96″ H (38 cm) x 14.96″ W (38 cm) x 8.27″ D (21 cm) F67-Series: NEMA-4 metal, 23.5″ H (60 cm) x 15″ W (38 cm) x 8.25″ D (21 cm)
Weight:	Average 51 lb (23 Kg)

FCC Information

Model	Applicable Parts of Rules	Authorized Emissions	Type Acceptance Number
F6523/F6723	15, 22, 74, 80, 90	16K0G3E, 20K0F2D	AZ489FT3699
F6553/F6753	15, 22, 74, 80, 90	16K0G3E, 20K0F2D	AZ489FT3700
F6573/F6773	90	15K0F2D, 16K0F1D 16K0F3E	ABZ9QCT3733
F6514/F6714	15, 22, 74, 80, 90, 95	16K0G3E, 20K0F2D	AZ489FT4700
F6544/F6744	15, 22, 74, 80, 90, 95	16K0G3E, 20K0F2D	AZ489FT4701
F6574/F6774	90	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT4737

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INTRAC 2000 System
Modular Remote Terminal Unit

INTRAC 2000 System Modular Remote Terminal Unit

High Reliability/Maximum Features/Compact Design—The MRTU is a fourth generation remote terminal unit that uses today's microprocessor, EEPROM, and surface mount technology to reduce an INTRAC 2000 MRTU into a single, compact module that performs all of the listed functions and more.

The MRTU offers a new standard in RTU design that is second to none; combining high reliability, maximum standard features and compact design.

Digital Inputs—The MRTU can monitor and report the status of normally open (NO) or normally closed (NC) dry contacts.

Digital inputs provide for reporting of alarms or status changes, such as door open or closed, pump on or off or well level high or low.

Counter Inputs—The MRTU can be configured to report pulse, run-time, and pulse frequency data.

The counter capability permits flow data and motor run-time data to be reported to the central.

Field Configuration Program—Changes the parameters that control the operation of the MRTU.

Configuration additions and changes are easily accomplished with no dependence on factory or depot personnel.

Digital Control Outputs—The MRTU can generate momentary (basic module) and momentary or latched (control expansion module) relay contact outputs.

Digital controls provide for relay control of electrical equipment, such as switching motors and heating or cooling devices on and off.

Backup Power Supply—Each MRTU operates from an AC power transformer and includes a charger with battery to supply up to 12 hours of backup should commercial power fail. AC power status changes are automatically reported to the central location.

Allows for system operation even during commercial power loss due to electrical emergencies, natural disasters and severe storms, while keeping the central operator appraised of current operating conditions.

Optional Expandability—The expandable MRTU combines a modular "building block" construction with an "onboard" data base, allowing the MRTU's digital input and output capabilities to be easily expanded.

Allows the MRTU to meet most monitoring and control needs (See the MRTU PLUS for analog input/output needs). Spare modules can be stocked for expansion or "instant repair".

Optional Heavy Duty Housing—The expandable MRTU can be supplied in a NEMA-4 metal housing suitable for outdoor mounting. A removable bottom plate allows easy machining when special holes are required.

The weather resistant housing offers rugged construction and environmental durability.

Local Display—The basic MRTU and each status expansion module includes a built-in LED local status display.

Offers an "on site" display of status inputs to aid the technician in correction of reported problems.

Self-Diagnostic Capability—Each MRTU is equipped with a pushbutton activated self-test program that signals the condition of the unit on the LED local display.

Reduces equipment downtime and service costs by identifying the module or cable that needs repair or replacement.

Easy Installation and Service—Each MRTU module can be easily removed via two screws and two "quick-disconnect terminal" plugs.

Allows easy addition or replacement of input or output modules reducing equipment downtime and service costs.

Channel Monitoring—The MRTU monitors the radio channel before transmitting.

Reduces the possibility of missed alarms due to units "talking over" each other on the radio channel.

Secure Signalling—INTRAC 2000 messages are transmitted using a signalling format specifically designed for radio operation. Each message contains a high level of error checking and information redundancy.

Ensures accurate and reliable operation with no false alarms or erroneous controls even during high noise conditions.
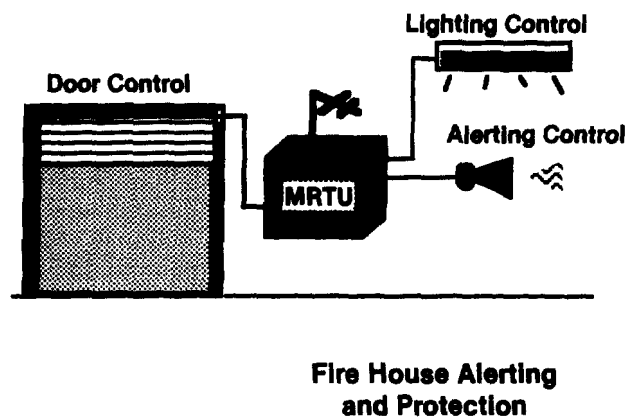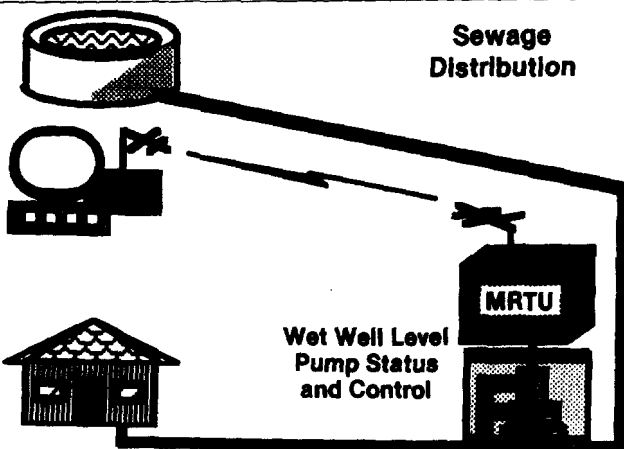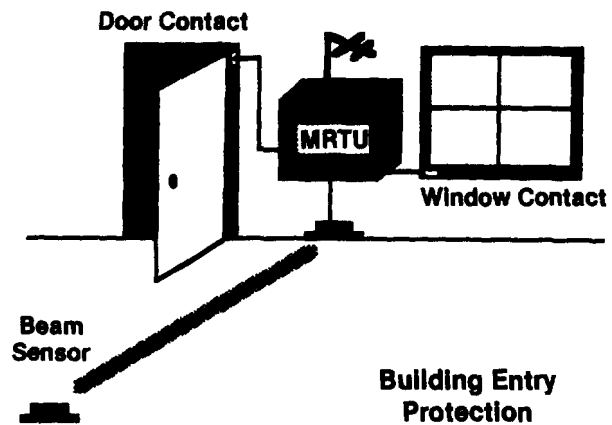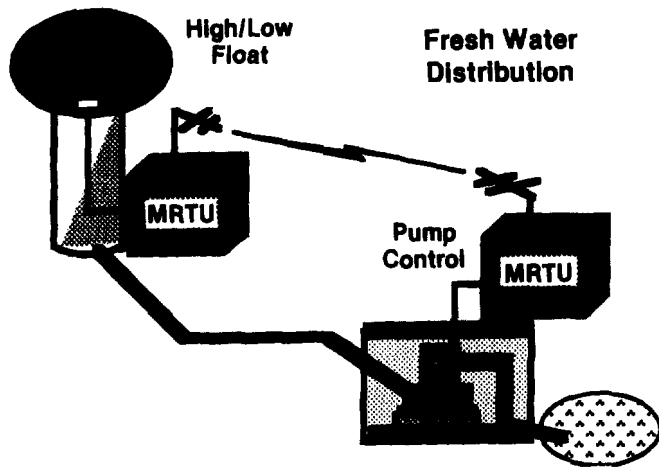

Contention or Polling—Status input changes are transmitted "as soon as they happen" at the MRTU (Contention) and/or in response to interrogation from the central unit (Polling).

Contention reporting provides fast update of alarms or changes in a monitored analog value. Polling ensures the timely update of the central unit's data base and detection of remote unit failures.

Remote to Remote Operation—MRTU's can "converse" with each other directly, as well as through a central unit.

A small MRTU-to-MRTU system can operate without a central unit, thus saving the initial cost of a central unit. When additional system growth requires it, a central can then be added.

High/Low Float — **Fresh Water Distribution**

Pump Control

Door Contact — **Window Contact**

Beam Sensor

Building Entry Protection

Sewage Distribution

Wet Well Level Pump Status and Control

Lighting Control

Door Control

Alerting Control

Fire House Alerting and Protection

The MRTU is a high quality remote terminal unit capable of handling many alarm and control requirements. Simply consult the chart below to find your application and the associated sensor types.

Fresh Water Supply

Well/Tank Level	High/Low Float switch
Reservoir Level	High/Low Float switch
Water Presssure	High/Low contacts
Pump Control	Relay contact
Pump Status	On/Off contact
Pump Run Time	On/Off contact
Bldg Entry Alarm	Magnetic switch or tape

Sewage Treatment

Wet Well Level	High/Low Float switch
Dry Well Level	High/Low Float switch
Pump Control	Relay contact
Pump Status	On/Off contact
Pump Run Time	On/Off contact
Bldg Entry Alarm	Magnetic switch or tape

Property Protection

Door/Window Alarm	Magnetic switch or tape
Motion Detector	Infrared or microwave sensor contact
Sound Detector	Relay contact
Lighting Control	Relay contact
Zone "Trouble"	Relay contact
Temperature	High/Low contacts
Humidity	High/Low contacts
AC Power Loss	Relay contact

Petroleum/Chemical

Well/Tank Level	High/Low Float switch
Pump Control	Relay contact
Pump Status	On/Off contact
Pump Run Time	On/Off contact
Pressure	High/Low contacts
Leakage	Sensor contact
Bldg Entry Alarm	Magnetic switch or tape

Fire Station Dispatch

Alert Horn Control	Relay contact
PA Control	Relay contact
Lighting Control	Relay contact
Door Control	Relay contact
Bldg Entry Alarm	Magnetic switch or tape

Agriculture

Vineyard Frost Warning	Low temperature contact
Orchard Frost Warning	Low Temperature contact
Confinement Bldg Temp.	High/Low temperature contact
Freezer Temperature	High/Low temperature contact
Bldg Entry Alarm	Magnetic switch or tape

INTRAC 2000 System Modular Remote Terminal Unit

Performance Specifications

Frequency (MHz)	Model	Minimum RF Power Output	Receiver Sensitivity (20 dBQ)	Receiver Selectivity @ 25 kHz	Frequency Stability −30/ +60°C (+25°C Ref.)
136-174	F6053	5 W	0.35 μV	80 dB	T = ± 0.0005% R = ± 0.001%
403-430 440-470	F6014	1 W	0.5 μV	70 dB	T = ± 0.0005% R = ± 0.0007%

Primary Power:	115/230 Vac 50/60 Hz (12 Vdc optional)
Battery Backup:	Avg. 12 hrs (450 mAhr) @ + 25°C, one 2-second transmission per hr
Address Capacity:	Up to 512 per system selected from 2048 available INTRAC addresses
Data Rate:	600 Baud using FSK tones of 900/1500 Hz
Word Length:	Approximately 80 milliseconds
Transmit Airtime:	Typically 0.5 seconds (2.0 seconds maximum per remote)
Code Security:	Concatenated code including Bose Chaudhuri, parity, bit count and sync check
Status Inputs:	Basic: 8 or 6. Expanded: up to 40 Maximum (dry contact, <3Kohm = closed, >40Kohm = open)
Control Relays:	Basic: 1 or 2 (momentary). Expanded: Up to 18 Maximum (momentary or latching, rating .6A @ 120 Vac)
Transient Protect:	2.5 kV per ANSI C37.90-1978 standard, non-destructive
Transmit Repeats:	Up to 16 with a variable 10-80 seconds repeat interval
Acknowledge Mode:	Stops transmission repeats after acknowledgment from Central
Periodic Tx Timer:	Capable of initiating a transmission at rates from 6 minutes to 24 hours
Operating Temperature:	− 30°C to + 60°C, up to 90% relative humidity, non-condensing
Housing Type and Size:	Mounting Plate: 9.0″ H (23 cm) x 4.0″ W (10 cm) x 3.5″ D (9 cm) NEMA-4 metal: 14.96″ H (38 cm) x 14.96″ W (38 cm) x 8.27″ D (21 cm)
Weight:	Basic: Avg. 3 lb (1.4 Kg). Expanded: Avg. 25lb (11.5 Kg)

FCC Information

Model	Applicable Parts of Rules	Authorized Emissions	Type Acceptance Number
F6053	15, 90, 95	15F2, 16F3, 16F9	ABZ9QCT3681
F6014	15, 90, 95	15F2, 16F3, 16F9, 5.6 F2	ABZ9QCT4668

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MOSCAD
Motorola SCADA
Remote Terminal Unit

Product Overview

The **MOSCAD** Remote Terminal Unit (RTU) provides a data collection unit with the intelligence required to operate in sophisticated Supervisory Control And Data Acquisition **(SCADA)** data systems. With MOSCAD, local processes can be thoroughly supervised; control decisions, utilizing data from both local and remote sources, can be made; informational messages to supervisory centrals or to other remote units can occur. MOSCAD utilizes reliable Motorola FM two-way radio as the message transmission medium to completely eliminate dependence on leased wireline networks.

MOSCAD can automatically make the control decisions required to manage the local process—no instructions or intervention by external supervisory equipment is required. These control, and other, actions are defined within MOSCAD in an advanced ladder-language format; the SCADA Application Development software program is available to assist in this effort. MOSCAD uses the MDLC communications protocol, which was specifically designed to transmit large amounts of data via FM two-way radio, when communications with supervisory or other remote units is required.

MOSCAD, Motorola SCADA, Remote Terminal Unit

Feature/Benefits

Local Intelligence—MOSCAD is a microprocessor based RTU with large memory capacity that can locally make control decisions based on status conditions and values from local and remote sources.

Local Intelligence permits control decisions without the need for real-time messages from other supervisory centers; MOSCAD can operate in sophisticated control systems.

Ladder Logic—MOSCAD uses an advanced symbolic *ladder-logic application language* to develop the data base conditions, values, and RTU profile that must exist for each control action, message transmission, etc. to occur.

Powerful applications may easily be defined using industry accepted ladder logic. The task is made easier by using the SCADA Application Development software and an IBM PC computer.

MDLC—MOSCAD uses the MDLC communication protocol for all data signalling.

Specifically developed for two-way radio use but completely applicable to wireline, microwave, and fiber optic media, MDLC permits large volumes of data to be quickly transferred between terminals using packet transmission techniques.

Upload/Download—MOSCAD, via the MDLC data transfer capability, uploads the data collected and calculated by the application program to a central site and receives downloaded changes in the application program and in the parameters that control how the application operates.

The process being supervised need not be static; operational variables and limits, and the process definition itself, can be easily changed and transmitted to the RTU. Site visits by maintenance personnel are not required.

Diagnostics—MOSCAD incorporates self-diagnostic software routines to help maintenance personnel identify and correct operational problems. The ladder-logic application itself can log operational problems and transmit that data to a supervisory terminal using MDLC.

Self diagnostics and error reporting capabilities, plus local LEDs, permit maintenance personnel to repair malfunctions in the shortest possible time.

Communications—MOSCAD permits communications to occur RTU-to-central and RTU-to-RTU. Communications may occur between individual units or may be "broadcast" to several

Modular—The core capabilities of MOSCAD are present in the CPU module. Other modules provide digital and analog input and output capabilities. Each module provides LED indicators that monitor the operations of the module.

Modular construction permits configuring each RTU to meet the precise requirements of each application, and permits future expansion as the application expands. Maintenance personnel need only to replace modules to restore proper operations.

CPU Module—The CPU module contains the microprocessor and associated RAM/ROM to control the connected I/O modules, the radio, and the communication ports.

All core functions, including system, application, and communication software, are contained in this module.

I/O Modules—Digital and analog input, digital and analog output, and combination input/output modules are available for those on-site inputs and outputs.

The digital input module includes high-speed counter capability. The relays on the digital output module provide either momentary or latch operation.

RS232/RS485 Ports—Connectors on the CPU module permit the connection of a terminal for application programming, a second terminal or printer for local operator I/O, and the radio.

Multiple connectors, multiple communication protocols, and variable data speeds allow practically all external Data Terminal Equipment (DTE) to be connected to the CPU module.

Dual Power Supply—MOSCAD is available with dual power supplies: a battery capable of fully powering the RTU, and an ac operated power supply that also recharges the battery.
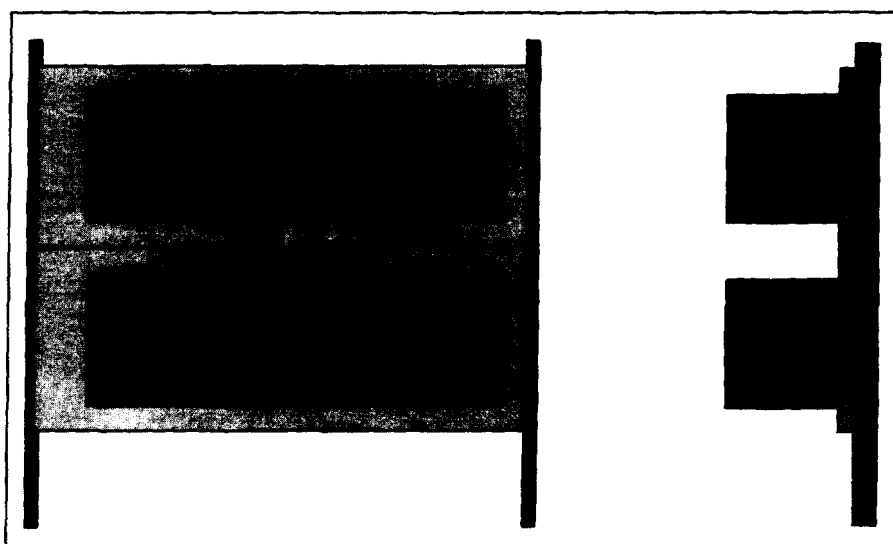
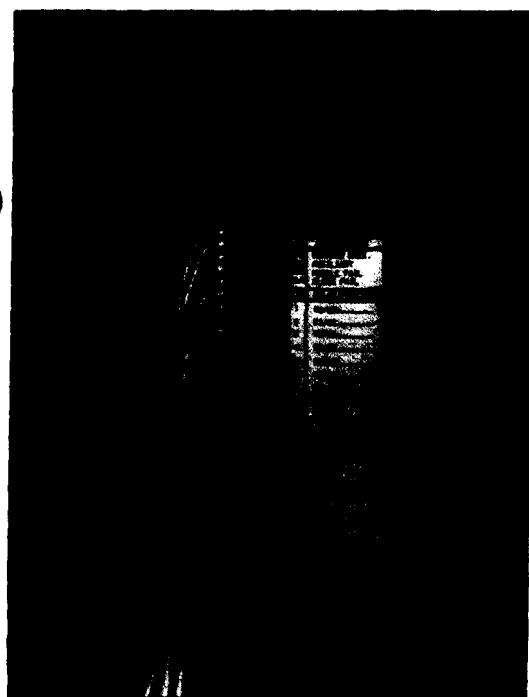**Dual power sources insure continuing operation during ac power failures.**

Power
Supply

CPU Module

RS-232 or
RS-485

RS-232

RsdNo

Ladder-Diagram
Application
Program

DI   AI   DO   AO
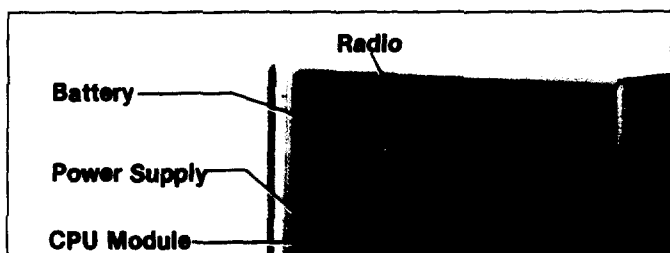
The *CPU Module*
controls all
operations
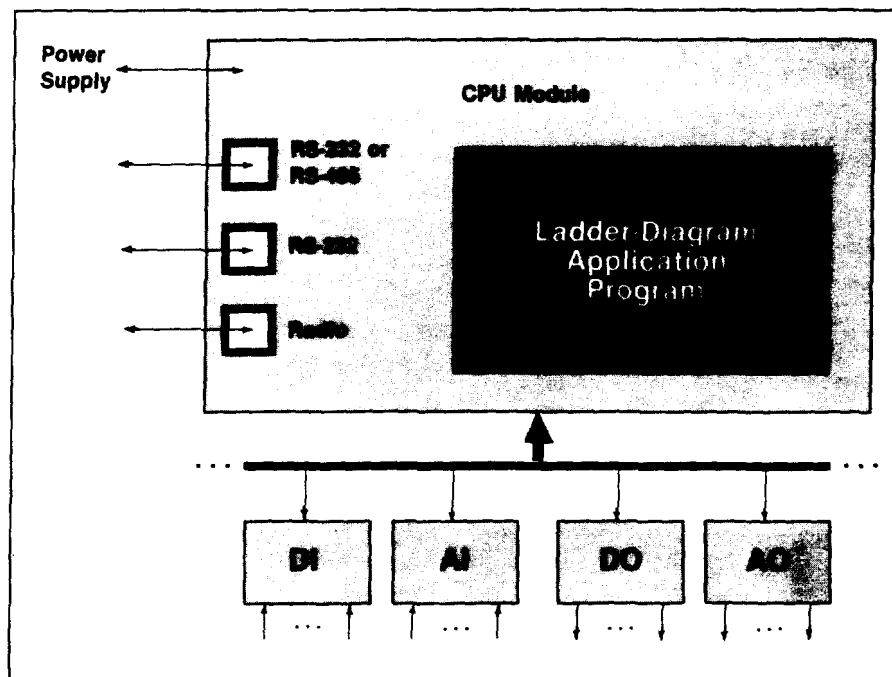
Plug-in I/O module
showing LEDs and user
connector

Rack-mount with space
for 15 I/O modules

MOSCAD, Motorola SCADA, Remote Terminal Unit

Specifications

General	Physical:	NEMA-4 steel enclosure (1-6 modules): 19.7″ × 19.7″ × 8.3″
		Rack mount (1-8 modules); 19″ × 10.5″

TAB B

APPENDIX B

COVERAGE AREAS WITH REDUCED POWER

In these maps, Motorola has compared the talk-in and talk-out coverage achieved with a single high powered base station to the coverage achieved with a single station conforming to the proposed rule changes. Specifically, Attachment 1 shows the talk-out coverage area of a 304.3 Watt/54.83 dBm ERP base station at 1147.6′ HAAT. Talk-in coverage for 100 Watt mobile units with 2 dB gain antennas is detailed on Attachment 2, and is virtually identical to the talk-out coverage. Attachment 3, however, shows talk-out coverage for a base station conforming with the rule changes proposed in the Notice (i.e., 5 Watts/37.0 dBm) at the same HAAT. This attachment shows a reduction of 67 percent in talk-out coverage area. The remaining Attachments, numbered 4 through 7, show the equivalent facilities that would be necessary to achieve the talk-out coverage detailed in Attachment 1, while conforming to the power limitations proposed in the Notice.
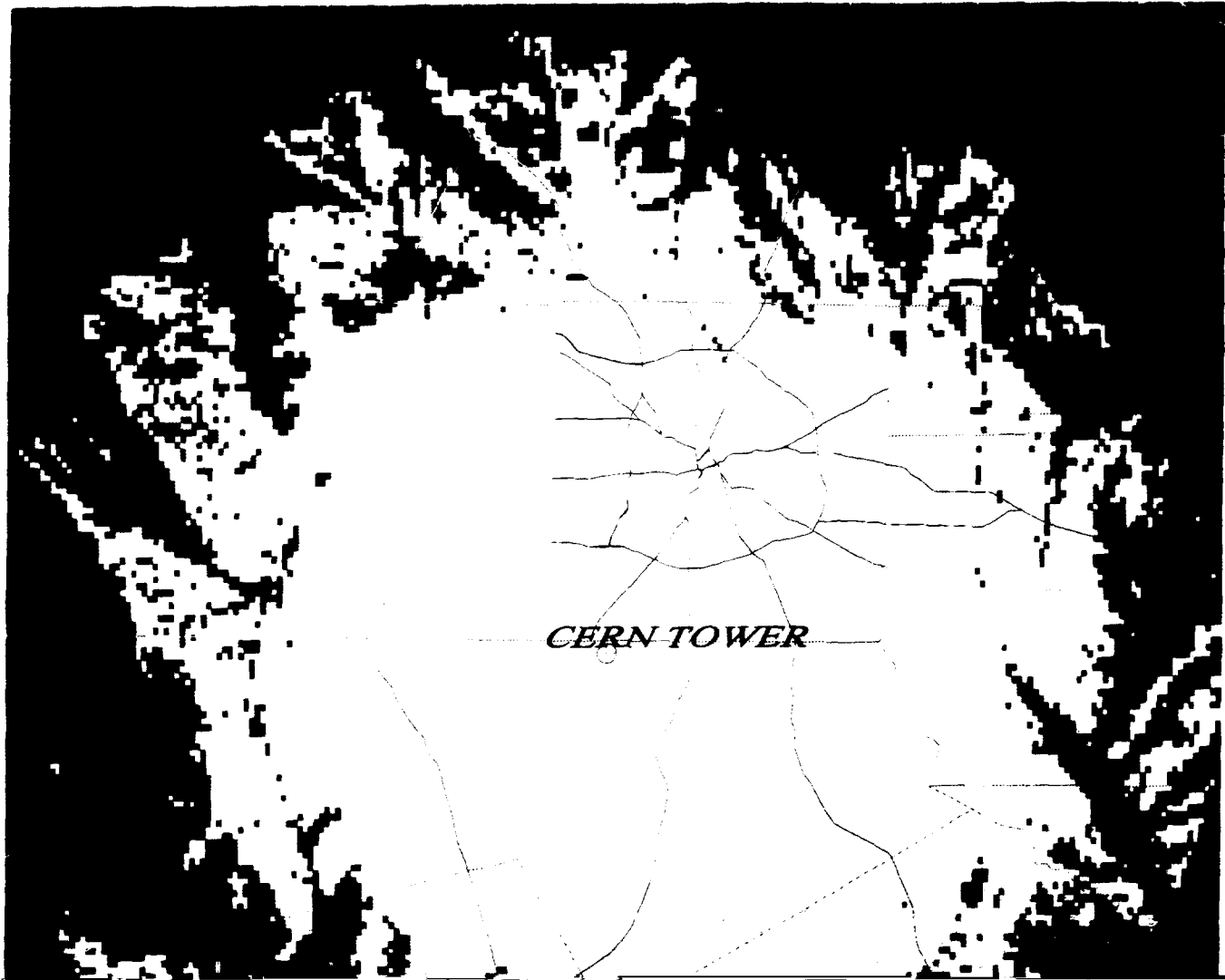
Freq : 461.0 Mhz
A/Ht : 1000.0 Ft.
HAAT : 1147.6 Ft.

92-235 UHF
CERN TOWER

Lat : 32 31 52.0
Long : 96 56 57.0
Elev : 794.0 Ft.

CERN TOWER

Freq : 466.0 Mhz   **92-235 UHF**   Lat   : 32 31 52.0
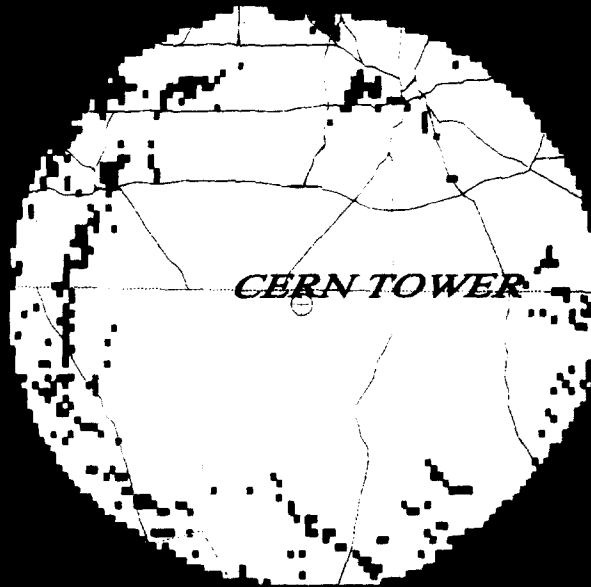
Freq : 461.0 Mhz
A/Ht : 1000.0 Ft.
HAAT : 1147.6 Ft.

92-235 UHF
CERN TOWER

Lat : 32 31 52.0
Long : 96 56 57.0
Elev : 794.0 Ft.

Reliability : %

0   90

MOTOROLA, INC.

0.0 5.0 10.0 15.0 20.0 25.0 30

SCALE : 15.00 MILES PER INCH
Job #   : 1041179663
Engineer   : caeg06
Date   : 05/12/1993
Time   : 15:47:14

Field Unit On Street
Base ERP   : 5.0W(37.0dBm)
Base Ant Az: 0.0°
H BeamWidth: 360.0°
FU ERS   : 0.50µv(-113.0dBm)
FU Ant Ht : 5.0 Ft.
FU Ant Type:

Calculated values are derived
using average loss values for
surroundings. Some low lying,
heavily wooded or urban areas
may result in lower values
than those indicated

Freq : 461.0 Mhz
A/Ht : 500.0 Ft.
HAAT : 552.5 Ft.

92-235 UHF
KPLX TWR

Lat : 32 40 31.0
Long : 97 12 23.0
Elev : 672.6 Ft.

KPLX TWR

Reliability : %

>

0   90

MOTOROLA, INC.

0.0   5.0 10.0 15.0 20.0 25.0   30

SCALE : 15.00 MILES PER INCH
Job #   : 1041044496
Engineer   : caeg06
Date   : 05/12/1993
Time   : 16:24:29
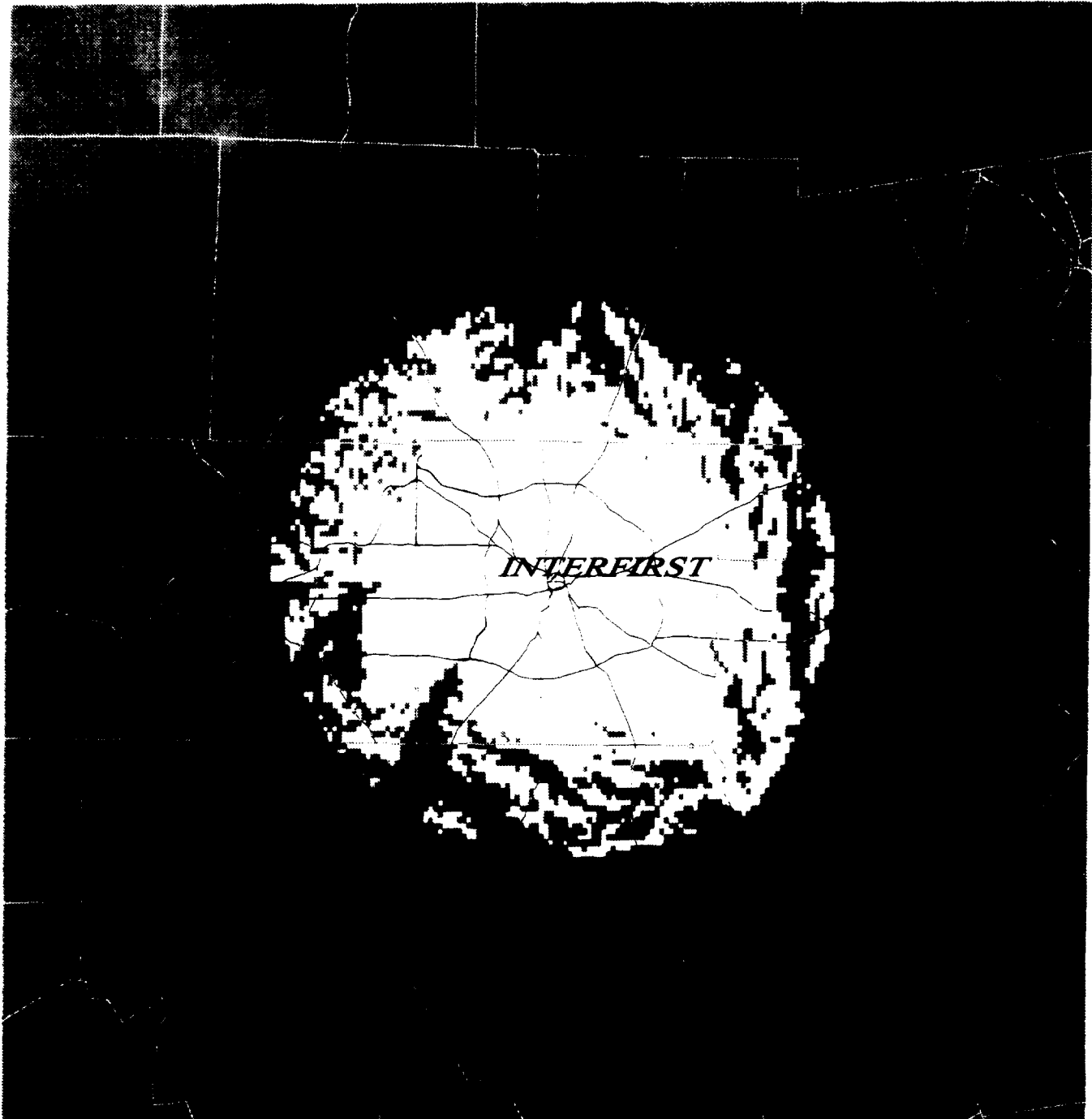
Field Unit On Street
Base ERP   : 30.0W(44.8dBm)
Base Ant Az: 0.0°
H BeamWidth: 360.0°
FU ERS   : 0.50μv(-113.0dBm)
FU Ant Ht : 5.0 Ft.
FU Ant Type:

Calculated values are derived
using average loss values for
surroundings. Some low lying,
heavily wooded or urban areas
may result in lower values
than those indicated

Freq : 461.0 Mhz   **92-235 UHF**   Lat : 32 46 58.0
A/Ht : 610.0 Ft.   INTERFIRST   Long : 96 47 53.0
HAAT : 557.5 Ft.   Elev : 452.8 Ft.

Reliability : %

>

Freq : 461.0 Mhz
A/Ht : 500.0 Ft.
HAAT : 486.9 Ft.

92-235 UHF
GRANDVIEW

Lat : 32 18 0.0
Long : 97 13 35.0
Elev : 705.4 Ft.

Reliability : %

0   90

MOTOROLA, INC.

0.0 5.0 10.0 15.0 20.0 25.0 30

SCALE : 15.00 MILES PER INCH
Job #   : 724440329
Engineer   : caeg06
Date   : 05/13/1993
Time   : 9:28:28

Field Unit On Street
Base ERP   : 30.0W(44.8dBm)
Base Ant Az: 0.0°
H BeamWidth: 360.0°
FU ERS   : 0.50µv(-113.0dBm)
FU Ant Ht : 5.0 Ft.
FU Ant Type:

Calculated values are derived
using average loss values for
surroundings. Some low lying,
heavily wooded or urban areas
may result in lower values
than those indicated

Freq : 461.0 Mhz
A/Ht : 500.0 Ft.
HAAT : 568.9 Ft.

92-235 UHF
SONOMA

Lat : 32 20 40.0
Long : 96 37 0.0
Elev : 498.7 Ft.

Reliability : %

>

0   90

MOTOROLA, INC.

0.0 5.0 10.0 15.0 20.0 25.0 30

SCALE : 15.00 MILES PER INCH
Job #   : 940323848
Engineer   : caeg06
Date   : 05/13/1993
Time   : 9:10:39

Field Unit On Street
Base ERP   : 30.0W(44.8dBm)
Base Ant Az: 0.0°
H BeamWidth: 360.0°
FU ERS   : 0.50μv(-113.0dBm)
FU Ant Ht   : 5.0 Ft.
FU Ant Type:

Calculated values are derived
using average loss values for
surroundings. Some low lying,
heavily wooded or urban areas
may result in lower values
than those indicated

TAB C

APPENDIX C

EMISSIONS MASKS

A.   12.5 kHz Mask

This 12.5 kHz mask is intended for reduced deviation analog (i.e., 2.5 kHz peak deviation) and advanced digital FDMA